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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SYN 51067/WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03193	International filing date (day/month/year) 28.07.2003	Priority date (day/month/year) 13.08.2002
International Patent Classification (IPC) or both national classification and IPC B01J20/06		
Applicant JOHNSON MATTHEY PLC et al.		


1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 05.03.2004	Date of completion of this report 15.11.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Gosselin, D Telephone No. +49 89 2399-8400



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International application No. **PCT/GB 03/03193**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-9 as originally filed

Claims, Numbers

1-7 received on 18.09.2004 with letter of 14.09.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference was made to the following documents:

D1: WO-A-0117674
D2: WO-A-02066156
D3: US-A-4849576
D4: US-A-4849577
D5: US-A1-2001027939
D6: GB-A-1357335

2. In response to objections of lack novelty and inventive step raised against claims 1 and 2 as originally filed, the amended claims 1 to 7 were filed with the letter dated 14.09.2004. Claim 1 is based on claims 1 and 3 as originally filed and supported by the application page 3, lines 19-24; claims 2 to 7 respectively correspond to claims 4 to 9 as originally filed. Therefore, claims 1 to 7 introduce subject-matter meet the requirements of Article 34(2)(b) PCT.
3. The features of claim 3 as originally filed is not supported by the priority document on which the priority claim is based, so that the priority claim of the present application is invalid for the claimed subject-matter.

Whilst the priority claim of the present application is a priori invalid, D2 is part of the prior art according to Rule 64.1 PCT, and should be considered for the International Preliminary Examination.

3. The present claims meet the requirements of Article 33(1) PCT, because their subject-matter is new in the sense of Article 33(2) EPC and involves an inventive step in the sense of Article 33(3) PCT in view of documents D1 and/or D2.
4. The catalyst bed composition of claim 1 differs from that of D1 or D2 in that the guard bed shaped units are formed from lead oxide particles and a mixture of two or more particulate hydrated materials. D1 discloses a guard bed material consisting of particles of a support material comprising lead oxide introduced either by impregnation or co-precipitation (I.a. Samples C or N). D2 discloses a guard bed shaped units formed by mixing lead carbonate particles and a

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particulate hydrated alumina; the shaped units are calcined, but preferably at a temperature below the decomposition of lead carbonate (page 3, lines 19-21). In non-preferred embodiments of D2, lead oxide can be present in the shaped units.

5. The subject-matter of claims 1 to 7 apparently involves an inventive step over the disclosure of either D2 or D1.

5a. The closest prior art is D2, because it is assumed that upon calcination lead oxide could be formed.

According to page 7, lines 19-20 of the application: " The increase in lead content indicates that lead oxide is formed."

This statement should also applies to the examples of D2, more particularly example 6 and table 2. It is assumed that the sorbents of this example (calcined at 300 and 400°C) necessarily comprise lead oxide particles upon calcination of at least part of the lead carbonate particles present in the carrier material upon shaping. Even if the shaped units were not formed by directly mixing and shaping powders of lead oxide particles and a particulate support material, the units of Example 6 of D2 may upon calcination have the same aspect as shaped units directly obtained by mixing lead oxide particles and a particulate hydrated alumina due to the transformation of the lead acetate into lead oxide. It should be further noted that the wording of claim 1 of the application does not excluded the presence of other materials than those explicitly mentioned in said claim.

The formation of lead oxide upon heat treatment between 300 and 700°C of lead acetate is confirmed by D3 to D5.

D2 further discloses the features of claims 2 to 7 in relation with lead carbonate particles, however the lead acetate particles can be transformed into lead oxide upon calcining.

The subject-matter of claim 1 essentially differs from the disclosure of D2 in that the guard bed shaped units are formed from lead oxide particles and a mixture of two or more particulate hydrated materials.

5b. According to the applicant the objective problem to be solved is to provide a guard bed comprising shaped units with better physical properties, for example crush

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strength (application: page 3, lines 19-21).

- 5c. This effect was not verified in the application documents as originally filed. The applicant provided comparative tests during International examination showing that such improvement might be obtained.

Since there is no suggestion in either D1 or D2 that the crush strength of the guard bed shaped units can be improved by mixing lead oxide particles and a mixture of at least two particulate hydrated aluminas, the subject-matter of pending claims 1 to 7 apparently involve an inventive step in view of the disclosure of either D2 or D1.

- 5d. For the sake of completeness, it is submitted that it was not possible to identify in the application documents as originally evidence that (i) the presence of the lead oxide as dispersed particles in the carrier material or (ii) the use of shape unit of the dimension indicated at page 2, lines 26-29, provides either an unexpected technical effect or solve a different technical problem, the examples of the application being not convincing (claim 1 as initially filed).

The commercial product (Comparative example 2b) is not sufficiently identified with respect to its structure (dimension, BET...) and the repartition and form of the available lead oxide.

The absorber of comparative example 2a does not comprise lead oxide and is far removed from the disclosure of D1.

In comparative example 2c, which is apparently prepared according to the preferred embodiment of D1 (Examples), the amount of lead oxide is too low. It is not representative of the less preferred embodiment of D1 with lead oxide as the lead compound and cannot even provide a fair comparison with the catalyst of Examples 1(a) and 1(b) of the application as the content of lead oxide is much lower than in Examples 1(a) and 1(b). The importance of comparing catalysts having identical contents of lead oxide is essential, as shown in example 3 of the present application where huge differences have been obtained by varying the lead oxide content of the samples.

Claims

1. A catalyst bed combination comprising a bed of a particulate copper-containing catalyst and, upstream of the catalyst bed, a guard bed of shaped units characterized in that the guard bed shaped units are formed by mixing lead oxide particles and a mixture of two or more particulate hydrated aluminas.
2. A combination according to claim 1 wherein the shaped units are formed from a composition containing a processing aid.
3. A combination according to claim 1 or claim 2 wherein the shaped units have a lead content of 5 to 75%, by weight of lead (expressed as metal).
4. A combination according to any one of claims 1 to 3 wherein the shaped units have a lead content of 30 to 75%, by weight of lead (expressed as metal).
5. A combination according to any one of claims 2 to 4 wherein the shaped units are formed from lead oxide, a mixture of two or more particulate hydrated aluminas and graphite.
6. A combination according to any one of claims 1 to 5 wherein the lead oxide used to form the shaped units has an average (by weight) particle size below 50 μm
7. A process for performing a catalytic reaction using a bed of a copper-containing catalyst, comprising passing a process gas through a guard bed of shaped units and then passing said process gas through the bed of copper-containing catalyst, characterized in that the guard bed shaped units are formed by mixing lead oxide particles and a mixture of two or more particulate hydrated aluminas.